

Examination of Head Start students' and teachers' attitudes and behaviors toward trying new foods as part of a social marketing campaign

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**EXAMINATION OF HEAD START STUDENTS' AND TEACHERS'
ATTITUDES AND BEHAVIORS TOWARD TRYING NEW FOODS AS PART
OF A SOCIAL MARKETING CAMPAIGN**

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ABSTRACT

Objective: To determine the impact of preschool teacher food-related attitudes and behaviors on child food behaviors.

Design: A twelve-week intervention and observational study with teachers completing questionnaires before and after the intervention.

Setting: Head Start classrooms throughout Virginia.

Participants: 177 preschool Head Start teachers and 1534 children.

Intervention(s): Food Friends, a twelve-week social marketing campaign, was conducted by Head Start teachers during the Spring 2007, introducing children to novel foods with food puppets, nutrition-related activities and novel food tasting opportunities. Hypotheses related to the impact of preschool teachers' food-related attitudes and behaviors on children's food behaviors were tested, and changes in teacher and child food behaviors were measured.

Main Outcome Measures: Teacher food-related attitudes and behaviors were measured/quantified. Child food behaviors were measured and compared to teacher attitudes and behaviors.

Analysis: Descriptive, correlational and t-test statistics were conducted.

Results: Teachers' and children's acceptance of novel foods improved after the Food Friends program, however, no direct correlations were found between teacher food-related attitudes and behaviors and child food behaviors.

Conclusions and Implications: Preschool teacher attitudes and behaviors may not significantly impact child food-related behaviors. More research is needed to determine effective ways of encouraging positive child food behaviors.

Attribution

I have been honored to have the opportunity to work with Dr. Elena Serrano throughout my undergraduate and graduate career. During this time, Dr. Serrano has taught me so much and has truly helped me prepare for my future career in dietetics. Dr. Serrano received her B.A. in Developmental Studies from the University of California, Berkeley. She later completed her M.S. and Ph.D. in Food Science and Human Nutrition at Colorado State University. Dr. Serrano has played an integral role in my education here at Virginia Tech, and without her knowledge, support and guidance, this wonderful experience would not have been possible.

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CHAPTER 1: INTRODUCTION

Childhood is a very important developmental period when adequate nutrient intake is imperative. Healthful eating habits in childhood are linked to optimal growth, development, learning, and possibly reduction of chronic disease risk (1). In order to ensure that children are getting the nutrients they need, they must be provided with, and consume, a variety of foods from each food group. According to MyPyramid, two- to five-year old children need five ounces of grains, 1.5 cups of vegetables, 1.5 cups of fruits, 2 cups of milk and four ounces of meats/beans each day. Further, the United States Department of Agriculture (USDA) recommends to “make half of your grains whole,” and to “vary your veggies,” by including dark green and orange vegetables in the diet (2).

Preschool-aged childrens’ diets appear to be more nutritionally adequate today when compared with childrens’ diets from the 1970’s (3). However, this apparent improvement comes along with increased consumption of fruit juices, added sugars, and overall increased caloric intakes, and may not necessarily reflect better variety, especially of fruits and vegetables. According to a government report published in 2001 (4), only 36% of two- to three-year old children were found to have a “good” diet, and only 17% of four- to six-year old childrens’ diets were classified as “good,” based on the USDA’s Healthy Eating Index (HEI) scoring system. More recently, a study conducted by Langevin and colleagues (5) found that urban children from a low socioeconomic environment were especially “at risk” for having poor dietary quality. The study found that, of 193 participants, 75% failed to meet USDA recommendations for grains, vegetables, dairy and fruit groups, greater than 25% of participants did not meet the

recommended intakes for folate and iron, and greater than 75% of participants did not meet the recommended intakes for calcium.

One factor that may limit the dietary variety in preschool-aged children is the fact that two- to five-year old children go through a normal developmental phase called “neophobia,” or fear of trying new foods. This phase may frustrate or baffle parents and caregivers who may react by providing a more limited variety of foods that the child is known to eat, eat rather than attempting to expand their child’s food preferences.

Research has found, however, that by repeatedly offering a new food to a child, the child may be more likely to accept it as it becomes more familiar to them (6). Children respond best to novel foods when they are presented repeatedly (eight to twelve times), in a positive and supportive environment (7). Adult figures, namely parents and teachers, play a critical role in encouraging acceptance of new foods and, in turn, expanding a child’s dietary variety and nutrient intake.

CHAPTER 2: LITERATURE REVIEW

IMPORTANCE OF DIETARY VARIETY IN CHILDREN

Defining dietary variety. The concepts of dietary variety, proportionality and moderation lay the foundation for federal dietary recommendations from the 2005 *Dietary Guidelines for Americans* (10, 2). In order to assess dietary variety as well as adherence to dietary guidelines/recommendations, the United States Department of Agriculture (USDA) developed a Healthy Eating Index (HEI) in 1995 with a subsequent revision in 2005 (11). The HEI is made up of twelve components: total fruit, whole fruit, total vegetables, dark green/orange vegetables and legumes, total grains, whole grains, milk, meat and beans, oils, saturated fat, sodium and calories from solid fat/alcohol/added sugar (SoFAAS). Each component is scored on a sliding scale. For most of the components, a higher intake would lead to a higher score, however several of the components are reverse scored, as lower intakes of them are more desirable (i.e. saturated fat, sodium and calories from SoFAAS). A diet could score anywhere from 0-100 points, with 100 points being the best score possible.

In 2005, the USDA conducted a study to determine the HEI scores of Americans (12). One-day food records provided by 15,011 participants in the USDA Continuing Survey of Food Intakes by Individuals (CSFII), 1994-96 and 9,032 participants in the National Health and Nutrition Examination Survey (NHANES), 2001-2002 were analyzed using the USDA HEI. In order to investigate population trends over the eight-year period, average intakes of each of the twelve dietary components were estimated by using a population ratio method in which the average intake of each item was divided by the total energy intake of the population. Between 1994 and 2002, dietary quality of

Americans changed very little. Scores for “total grains” and “meat/beans” components received the maximum amount of points, whereas all other components scored well below the maximum points possible (total score of 58.2 out of 100). It was concluded that overall, dietary variety was lower than optimal in American diets. In order to improve the quality of American diets, the USDA recommends increased intakes of fruits, vegetables, whole grains and low-fat milk products and decreased intakes of sodium and saturated fats.

Dietary variety in preschool-aged children. For children, dietary variety proves to be a concern as well. Kranz et al. (3) examined the dietary trends of American preschoolers, two to five years of age, between 1977 and 1998. They performed a review of overall dietary quality based on information gathered from the USDA National Food Consumption Survey (1977-1979), the USDA CSFII, 1989-1991, and the CSFII (1994-1996). Investigators developed a Diet Quality Index for Children (C-DQI) which was slightly different than the USDA’s Healthy Eating Index, analyzing diets based on the amounts of added sugars, fat, saturated fat, grains, fruit, vegetable, dairy products, excess juice and iron they contained. Each diet category was tallied and scored on a scale of zero to ten based on the number units consumed (with reverse coding for categories in which lower intake was optimal), and then a score was given for the combined totals of all groups with 70 being the highest possible score.

Overall dietary quality, defined as less of the undesired categories (added sugars, saturated fat, excess juice) and more of the desired (fruits, vegetables, grains, dairy products, iron), improved slightly between 1977 and 1998 (43.8 in 1977 vs. 45.8 in 1998,

$P \leq 0.0019$). There were significant increases in the number of servings of grains (score of 6.6 in 1977 vs. 8.5 in 1998, $P \leq 0.0019$), fruits and vegetables (score of 4.9 in 1977 vs. 6.7 in 1998, $P \leq 0.0019$), excessive fruit juice (score of 9.6 in 1977 vs. 7.2 in 1998, $P \leq 0.0019$) and added sugars (score of 2.4 in 1977 vs. 2.1 in 1998, $P \leq 0.0019$) consumed. There were significant decreases in the percent of calories from total fat (score of 2.7 in 1977 vs. 3.4 in 1998, $P \leq 0.0019$) and saturated fat (score of 2.3 in 1977 vs. 3.0 in 1998, $P \leq 0.0019$), dairy servings (score of 6.4 in 1977 vs. 6.1 in 1998, $P \leq 0.0019$) and milligrams of iron (score of 9.1 in 1977 vs. 8.8 in 1998, $P \leq 0.0019$) ingested per day. Total energy intake increased from 1389 kcals to 1558 kcals per day, which accounts for the observed decrease in the percent of calories from fat because daily fat intake was 56 grams for each time point.

Food preferences. Infants begin life with an innate preference for sweet and salty flavors and rejection of bitter and sour tastes (13). From an evolutionary perspective, these preferences may have been protective. Bitter flavors may have warned omnivores of poisonous plants or other toxins, while sweet and salty flavors may have indicated food items high in energy, which was desperately sought after in past human history for survival purposes. Because today's food environment in the United States is one of overabundance for the most part, the innate human food preferences may set children up for unhealthy diets unless better food habits are learned. Vegetables, for example, often have a bitter flavor even though they provide many nutrients that are necessary for growth and development.

Fortunately, research has shown that by exposing children to different foods at a young age, taste preferences can be impacted. Mennella and Beauchamp(14) studied the effects of three different types of infant formulas on taste preferences in four- to five-year old children. Subjects were 102 four- to five-year old children categorized into three different groups based on the type of formula they received as an infant: milk-based (n=27), soy-based (n=25) or protein hydrolysate-based (n=50). Each group had equal representation of males and females. Children were asked to taste and rate (“like” or “don’t like”) three different types of apple juice—one was unaltered, one had added lemon juice to give it a sour flavor and one had added naringen (a compound found in grapefruit rinds) to give it a bitter flavor.

Results showed two main differences in taste preference. First, children who consumed the protein hydrolysate-based formula as infants were more likely to prefer the sour-flavored apple juice compared to those who consumed milk-based formula (P=0.01). Second, children who consumed soy-based formula as infants were more likely to prefer the bitter-flavored apple juice compared to those who consumed milk-based formula (P=0.01). Another interesting finding was that mothers of children who were fed soy or protein hydrolysate-based formulas reported their children were more likely to prefer broccoli, a bitter vegetable, than were those who received milk-based formula. This study provides evidence that although humans are born with certain innate food preferences and dislikes, the types of foods to which one is exposed can impact and even change taste and food preferences at a young age.

Food neophobia. Food neophobia is defined as fear of trying novel foods and is a common characteristic among preschool-aged children (13). Research suggests that food neophobia in children may lead to decreased dietary variety and further, inadequate consumption of certain nutrients, in comparison to children without neophobia. Falciglia and colleagues conducted a study in 2000 (15) with seventy fourth and fifth grade children using the Food Neophobia Scale. This scale, developed by Pliner and Hobden(16), consists of a ten-item questionnaire where each item is rated on a scale of one to seven points with one being “extremely low” and seven being “extremely high.” Children were assigned to groups based on their level of food neophobia. They were put into the “neophobic” group (24 participants) if they scored 41 points or more, the “average” group (23 participants) if they scored 28-40 points and the “neophilic” group (23 participants) if they scored 27 points or less. Three 24-hr dietary recalls were then collected from each child—two weekdays and one weekend day to determine actual food intakes. Diets were assessed for nutrient and energy composition and were rated using the USDA’s Healthy Eating Index (HEI). An overall food frequency list was developed for each group, and the number of “unique” foods, meaning those foods that only showed up on one of the group’s lists, were tallied.

Diet analysis revealed that all three groups were similar in respect to the amount of nutrients consumed each day with the exception of vitamin E being lower in the neophobic group ($P < 0.05$). There was a trend towards higher energy intake in the neophilic group [1,899 calories per day in neophilic group vs. 1,660 (neophobic) and 1,644 (average); $P=0.06$], but when this increase in calories was tested as a covariate with nutrients in the diet, it was found to have no significant influence on nutrient intake.

Finally, there was a significant difference in the overall HEI score between the groups (62.3, 66.1, 70.4 for neophobic, average, and neophilic respectively; $P < 0.01$). The neophobic group had the lowest HEI scores primarily due to increased saturated fat consumption and decreased dietary variety. All three groups appeared to eat the same “core foods” (white bread, dry cereal, 2% white milk, etc.), however differences were found in the amount of “unique” foods that were consumed. As expected, it was found that the neophilic group ate the highest amount of unique foods, while the neophobic group ate the lowest amount of unique foods. These results suggest that neophobic children have less healthy diets, particularly diets that are higher in saturated fat and deficient in vitamin E, and lower dietary variety when compared to children with normal and neophilic attitudes towards food. It could be hypothesized that if neophobic tendencies are changed at a young age, children may grow up to have more varied, healthy and nutritiously complete diets.

As mentioned before, food neophobia is defined as fear of or unwillingness to eat novel foods. Pickiness, on the other hand is defined as an unwillingness to eat familiar foods. Just as neophobia might affect dietary intake, so might pickiness. Galloway and colleagues (17) performed a study to determine whether food neophobia and pickiness contributed to low vegetable intake in seven year old girls. Participants included 192 Caucasian young girls and their parents from the central Pennsylvania area. Food neophobia was ascertained using the Food Neophobia Scale for Children, a six-item questionnaire that was adapted from the ten-item Food Neophobia Scale for adults (16), in conjunction with the Food Situations Questionnaire (18), a measure of children’s willingness to try novel foods in stimulating versus non-stimulating situations. The

classifications of pickiness were based on three questions regarding parental perception of their child's willingness to eat during mealtimes. Each question was answered using a Likert-type scale of one to five points and the responses were averaged. The higher the score (i.e. four or five points), the more picky a girl was seen to be. Intakes of vegetables, excluding potatoes consumed as potato chips or french fries, were determined using three 24-hour recalls in which mothers were asked to report on their daughters' food intakes. Information was gathered on several other parameters including child anxiety level, parental avoidance of new foods and attitudes towards child feeding, usual dietary intakes of vegetables and breastfeeding practices of mothers. Anxiety levels were measured using an adapted version of the Manifest Anxiety Scale, parents completed the Food Neophobia Scale questionnaire, the Child Feeding questionnaire was administered to determine parental attitudes towards child feeding, and food frequency questionnaires that focused on vegetable intake were used to determine vegetable consumption over a three-month period.

Using a quadrant system to classify the 189 subjects, 57 (30.2%) were found to have low pickiness and low neophobia, 43 (22.8%) were found to have low pickiness and high neophobia, 36 (19.0%) were found to have high pickiness and low neophobia, and 53 (28%) were found to have high pickiness and high neophobia. Subjects with anxiety and/or those having mothers with neophobia were more likely to be classified as highly neophobic, while girls who have mothers who consume a low variety of vegetables and who were breastfed for less than six months were more likely to be classified as highly picky. Further, girls who had high pickiness and high neophobia consumed fewer vegetables than girls who had low pickiness and low neophobia (1.1 ± 0.1 , 1.6 ± 0.1

servings of vegetables per day, respectively; $P < 0.05$). There was a trend towards lower servings of vegetables being consumed by girls classified only as highly picky or highly neophobic, but these trends were not found to be significant.

These results highlight the importance of addressing both food neophobia and pickiness at an early age in order to, hopefully, promote vegetable intake and better dietary variety in general for young girls. Because it was seen that certain mothers' characteristics including maternal neophobia, low variety of vegetable intake and breastfeeding practices were highly influential on their daughters' food attitudes, it is important to educate parents, and adults, in general, to maintain a positive attitude about food when they are around children because children might easily adopt bad attitudes and behaviors from adults.

GENETIC AND ENVIRONMENTAL FACTORS THAT IMPACT CHILD FOOD BEHAVIORS

There are many different factors that impact child food behaviors and, in turn, lead to diets that lack variety. Genetics and a wide range of environmental factors, such as maternal diet during pregnancy, parent education level, socioeconomic status, home location, ethnicity, food availability and peer influences may all contribute to a child's food behaviors on some level.

It has long been hypothesized that the maternal diet, both prenatally and during breastfeeding, can impact a child's taste and food preferences for life, but the exact extent to which this influence occurs is unknown. Mennella et al. (19) conducted a study to examine the potential effect of the maternal diet and its food and flavor composition on infant taste preferences. Subjects included forty-six pregnant women in their last trimester of pregnancy who intended to breastfeed. The women were instructed to consume either 300 mL of carrot juice or water for four days per week during three consecutive weeks in the last trimester of pregnancy and then again throughout the first two months of breastfeeding. They were assigned one of three groups: group one—carrot juice during pregnancy then water during lactation; group two—water during pregnancy and carrot juice during lactation; and group three (control)—water during both pregnancy and lactation.

To assess possible effects of the carrot juice supplementation, researchers followed up with the infants four weeks after mothers began to add cereal to their diet but before any carrots or carrot products were added. Infants were then fed cereal made with water and cereal made with carrot juice on two separate days. Feeding sessions were video-recorded and the infants' facial expressions were catalogued and analyzed for

negative reactions. At the end of each feeding, mothers, who were unaware of the hypothesis of the study, were asked to rate how well their infant liked each cereal on a scale of one to nine.

Infants who were exposed prenatally to carrot juice had more positive feeding experiences with the cereal and carrot juice mixture. They exhibited fewer negative facial expressions, compared to the control infants ($P=0.03$), and their mothers rated them as enjoying the feeding experience more so than the control infants' mothers ($P=0.005$). Infants whose mothers consumed carrot juice during lactation trended toward a more positive experience with cereal and carrot juice, however the results were not statistically significant. These results suggest that what pregnant and lactating women consume may influence their child's acceptance of foods later in life.

Genetic and environmental factors contribute significantly to child food behaviors, but it is often difficult to distinguish between "nature versus nurture." Cooke and colleagues (20) attempted to quantify the respective contributions of genetics and environmental factors on a child's food neophobia. Their study focused on twins, aged eight to eleven. They analyzed a total of 5390 pairs of twins (1913 monozygotic (MZ) twins and 3477 dizygotic (DZ) twins) who were also participating in the Twins Early Development Study (TEDS) in the United Kingdom at the same time. Because monozygotic twins share one hundred percent of their genes and dizygotic twins share about fifty percent of their genes, a twin study provided a great opportunity to determine the relative contributions of genetics (nature) versus environment (nurture).

Parents of the twins were asked to fill out a survey regarding their perception of their children's eating behaviors which consisted of a shortened, four-item scale instead

of the ten-item version of the Child Food Neophobia Scale (16). A separate survey was filled out for each child. Statistical analysis was conducted to determine the amount of influence from genetics, shared environment and non-shared environment on food neophobia. Heritability, defined as “the proportion of phenotypic variance that can be ascribed to heritable genetic influences,” was calculated as twice the MZ-DZ correlation difference. The shared environmental influence was calculated by subtracting the estimated heritability from the correlation in the MZ group, and the remaining variance was deemed to be non-shared environmental influence, including potential measurement errors.

Researchers found that food neophobia scores for MZ twins were much more highly correlated than the scores for DZ twins ($r^2 = 0.78, 0.36$ respectively; $P < 0.001$), so it was concluded that there was a high heritability for neophobia (0.78, $P < 0.001$). Based on genetic modeling, the rest of the 22% of variance was determined to be from non-shared environmental factors. Previous research has suggested that the average parent-child or non-twin, sibling-sibling food neophobia correlations were about 0.3 (17), so there is still evidence in favor of heritability for neophobia in non-twins. Still the evidence from this twin study is much stronger and more compelling in favor of genetics when 100% of genes are shared.

Researchers have had a keen interest in what specific aspects of a child’s environment contribute most to their developing dietary habits. To determine the environmental contributors to children’s dietary habits, Cooke and colleagues (21) sought to determine the predictive variables that would specifically impact fruit and vegetable consumption by preschool children. They conducted a cross-sectional survey of 564

parents or principal caregivers of two to six year old children. Demographic information was ascertained, including parental education level, age, ethnicity and various markers of socio-economic status. A food frequency questionnaire was used to determine the average intake of fruits and vegetables for caregivers/parents and their children. Questions about parental feeding practices were asked in order to determine the timing and location of childrens' meals and whether or not the children consume the same types of foods as the adults in each family. Finally, the child's food-related characteristics were determined using the Child Food Neophobia Scale (16) and the Child Enjoyment of Food Scale from the Children's Eating Behavior Questionnaire (22).

Results showed that there were several key predictive variables that impacted fruit and vegetable consumption. Parents who had higher education levels had children who ate more vegetables ($P=0.007$). White children ate more fruit than other ethnic groups ($P= 0.04$). Parents who ate more fruits and vegetables themselves had children who ate more of these food groups ($P < 0.001$). The earlier a child was introduced to fruits and vegetables, the more likely they were to consume higher amounts ($P= 0.02, 0.004$). Children who had been exclusively breast-fed ate fruits and vegetables more frequently than those who had been either breast and bottle-fed or exclusively bottle-fed ($P < 0.001$). Lower child food neophobia and greater enjoyment of food were predictive of higher intakes of both fruits and vegetables ($P < 0.001$).

One final aspect of a child's environment that might be influential on their food behaviors is peer influence or peer modeling. According to the Social Cognitive Theory(23), peer modeling, or demonstration of a particular behavior from one member of a peer group to another, is a very powerful tool in promoting behaviors. Peer

modeling has been studied extensively in contexts such as smoking, drinking and substance abuse, and has been found to be highly effective in promoting these undesirable behaviors (24). Few studies have attempted to look at peer modeling and acceptance of new foods in preschool children.

Hendy (25) conducted a study to examine the effectiveness of trained peer models on food acceptance in preschool children during meals. The study consisted of 38 children aged three to six—16 trained as peer models and 22 as observers. Three novel foods (dried papaya, dried apples and dried sweetened cranberries) were presented each day for a week during three baseline meals and two modeled meals. The peer models were given a small toy in exchange for eating the novel food and saying, “These _____ taste good!” The number of bites of each novel food taken was recorded and analyzed for each child. In order to prevent confounding teacher influence during the meal, teachers were asked not to eat the novel foods, which would not be uncommon, as it had been observed in the past that these teachers typically consume less than 25% of the meal items offered to their children.

Interestingly, different outcomes were found depending on the sex of the peer model. Researchers found that girl models were more effective in encouraging food acceptance for the rest of the on-looking children than boy models ($P=0.014$) and that more bites of each novel food were taken in correlation with more bites being taken by the girl models ($P=0.033$), even when results were controlled for age, weight, BMI, number of bites taken and social competence. Authors speculated that perhaps “women are more likely than men to be perceived as the ‘nutrition gatekeeper’ of the family, so young children may be more accustomed to modeling what females eat.”

After one month without intentional peer modeling in place, researchers followed up with the preschool children to determine their current level of food acceptance. The novel foods were given again, this time with no peer models in place. It was found that although more bites of each novel food were taken during the week of peer modeling, there was no residual effect one month later, and fewer bites of each novel food were taken during the follow-up. This may be attributed to the relatively small number of exposures (five) to the novel food, whereas research suggests that up to ten or twelve exposures are needed for young children to accept a novel food item (26). Also, perhaps the act of peer modeling is needed for longer than one week in order to be effective.

PARENTAL AND TEACHER IMPACT ON CHILD FOOD BEHAVIORS

Scientists have tried for years to explain human learning behaviors utilizing behavioral theory models. In 1941, the Social Learning Theory was proposed by Miller and Dollard (27), which purports that people learn through observation, and if a particular behavior is seen to be positively rewarded, this further encourages the behavior. Albert Bandura expanded on the Social Learning Theory, creating the Social Cognitive Theory (23). He speculated that learning occurs through observation and further, that people are will learn better if they have a close association with the one they are observing and if they possess sufficient self-efficacy, or belief that they are able to accomplish the observed behavior. The Social Cognitive Theory (SCT) is a commonly used behavioral model with young children, as their behaviors are more easily influenced by those who are close to them, namely their parents and any other adult figures in their lives because adults are in control of many mediators of behavior.

Parental dietary attitudes and effects on children. It is well known that knowledge and attitudes can play a role in human behavior. To investigate the potential influences of parental dietary attitudes (degree of dietary self-control, disinhibition and perceived hunger) on the subsequent development of obesity in their children, Hood and colleagues conducted a six-year prospective observational study (28). They hypothesized that parental attitudes towards their own eating might impact their children and subsequently lead to changes in adiposity of the children over a six-year period.

Subjects included 92 three to five year old children (36 girls, 56 boys) and their parents, taken from a cohort for the Framingham Children's Study. Parental eating behaviors were assessed using the Stunkard and Messick's Three Factor Eating

Questionnaire (TFEQ) (29). This survey addresses dietary cognitive restraint, disinhibition, meaning reduced capacity to manage an immediate impulsive response to a situation, as it applies to weight control and perceived hunger. Anthropometrics (height, weight, skinfolds) for parents and children were obtained annually. Childrens' activity levels were measured twice each year, for three to five days each period, using accelerometers. Food diaries were also kept periodically and analyzed for total calories and the percent of calories from fat.

Parental attitudes and behaviors towards their own eating had a significant impact on their childrens' levels of body fat over a six-year period. Specifically, children whose parents reported higher levels of disinhibition along with dietary restraint had greater increases in their BMI, triceps and sum of skinfolds than those whose parents had the lowest levels of restraint or disinhibition ($P=0.012$). This influence was seen most acutely in children with two parents who exhibited high levels of disinhibition and dietary restraint, whereas there was not such a marked effect when only one parent reported these dietary attitudes and behaviors. When parental BMI was controlled for, the differences between the highest category gains and lowest category gains in childrens' skinfolds were somewhat attenuated (19.3mm difference when controlled for BMI vs. 24.5mm difference when not controlled for BMI). This suggests that although most of the increase in body fat is associated with dietary attitudes and behaviors, there is still a genetic component to adiposity as well. Whereas young children are usually able to regulate their energy intake and respond properly to hunger cues in order to maintain their weight (30), this study demonstrates that if a child grows up in an environment in which adults are modeling dysfunctional dietary attitudes and behaviors, including

excessive dietary restraint and tendency for disinhibition, children may learn to have a dysfunctional relationship with food as well. On the other hand, if adults can model positive dietary attitudes and behaviors for young children, perhaps they will adopt a positive food relationship and be able to better maintain their energy balance throughout life.

Teacher modeling and acceptance of novel foods. Addessi and colleagues conducted an experiment to determine what, if any, specific social influence teachers have on the acceptance of novel foods in two to five year old children (31). One construct of the SCT, social facilitation, is an increase in the frequency of a familiar behavior pattern in the presence of others displaying the same behavior pattern at the same time.

Researchers hypothesized that social facilitation might occur between teachers and children during mealtime and, in turn, lead to increased acceptance of novel foods in preschool-aged children.

The study was designed using 27 two- to five-year-old children from the Pennsylvania State University Child Development Laboratory. Over the course of one month, three different foods were presented to each of the children (one per day for three days in a month)—semolina colored yellow and flavored with cumin, semolina colored green and flavored with caper paste, and semolina colored red and flavored with anchovy paste, all were a 100 gram portion. There were three different experimental conditions—one in which an adult model was present with the child while they ate but was not eating themselves (presence condition); one in which an adult model was present and was eating a different color of the semolina concoction (different color condition); and one in which an adult model was present and was eating the same color of semolina as the child (same

color condition). The adult model was a teacher aid, and was familiar to the child. Adult models received a sweetened version of semolina, so they had no trouble eating it enthusiastically. Nine children were assigned to each of the experimental designs. The semolina “snacks” were given to the children prior to lunch and the children were told, “Here is your snack to try, you can have as much as you want.” The children’s behaviors were videotaped and analyzed for frequency and type of eating behavior (i.e. putting food in mouth, chewing food already in the mouth, latency to ingestion). The actual amount of food eaten was also calculated by weighing the left-over food.

There were significant differences in the amount of food eaten and the food behaviors of children in the same color condition versus different color and presence conditions. Children in the same color condition accepted and ate more of their novel food ($P < 0.05$) than children in the other groups. They also had less latency to ingestion than children in the other groups ($P < 0.01$). This study provides evidence that, even though two to five year old children can experience food neophobia, novel foods may be more readily accepted when positive social facilitation methods are utilized.

Because teachers have been found to be potential facilitators of behavior (31), and they spend between four and eight hours a day with preschool-aged children, they have a good chance of influencing children through modeling of positive food behaviors. Hendy and Raudenbush (32) described five studies they had conducted in the past several years related to teacher modeling and food acceptance with preschool-aged children. Their studies held the premise that, according to the Social Cognitive Theory (SCT) (23), modeling by teachers should be a very effective method of encouraging children to try new foods.

In the first study, 58 teachers were given a questionnaire which asked them to rate the perceived effectiveness of teacher modeling in comparison to several other teacher actions (basic exposure, reward, insisting child tries one bite, choice-offering) on promotion of certain behaviors in children. Teachers thought modeling was a significantly more effective method to promote behaviors in children than all of the other actions ($p < 0.05$).

The second study compared the effects of silent teacher modeling versus simple exposure (control group) on children trying familiar foods. Thirty-four preschool-aged children were included in the study. During three meal times in the course of one week, a teacher would sit at a table with three to five children, and they would take one of two actions: silent modeling, in which they would eat at least one tablespoon of all the foods offered that day, or simple exposure, in which the teacher would sit with the children but not eat any of the foods presented. The meal was observed and the number of bites of food taken for each item was recorded. There were no significant differences in the number of bites taken for the silently modeled versus simple exposure foods. Therefore, contrary to teacher opinions in the first study, results of this study showed no difference between silent teacher modeling or simple exposure on the children's acceptance of familiar foods.

Because the SCT suggests that teacher modeling has the biggest impact with unfamiliar situations (23), study three was initiated to test the effect of silent modeling on preschool children's food acceptance with novel foods (chickpeas, prunes, water chestnuts, and matzo crackers). The novel foods were presented to 23 children during lunch time on three separate occasions, and teachers were assigned to either silently try

the foods or just sit with the children. An observer recorded the number of bites taken of each novel food during the meals. The results in this study were similar to those in study two—there were no significant differences in acceptance of the novel foods with silent teacher modeling. One interesting finding was that the children tried more of the foods during the first presentation than the subsequent second and third presentations, exhibiting a “novelty response” and curiosity towards new food items.

In the fourth study, two new foods (fresh mango and dried, sweetened cranberries) were presented to 26 preschool children during five separate meals and were accompanied by either enthusiastic teacher modeling (“Mmm! I love mangos!!”) or simple exposure. Unlike the second and third study results, this study found a significant main effect for the modeling condition ($p < 0.03$). Researchers hypothesized that the enthusiastic comments, especially those that mention rewards (good taste) may be effective in persuading preschool children to partake in novel foods. This finding is in line with the SCT, which hypothesizes that when someone observes a behavior that appears to be rewarded (the teacher rewarded with a good tasting food, for example) they are more likely to learn that behavior for themselves.

Finally, the last study that was reviewed by Hendy and Raudenbush looked at the effect of enthusiastic teacher modeling versus simultaneous competing peer modeling and consumption of novel foods in preschoolers. Fourteen preschool children were given three new foods (mangos, kiwis and dried apples) over the course of five meals. During the presentation of the new foods, the teacher would enthusiastically model consumption of one novel food while the trained peer model would model consumption of a competing food. The control group received simple exposure of foods. Analysis of variance by

gender showed that boys tended to equally accept new foods under all three models (teacher, peer, exposure) ($p < 0.43$). On the other hand, girls accepted the new foods most frequently with the peer modeling ($p < 0.03$). This data suggests that perhaps preschool-aged girls are more easily persuaded by peer modeling, and therefore, more subject to peer pressures at this age.

HEAD START PROGRAM

Head Start is a national program, directed by the United States Department of Health and Human Services (USDHHS), that promotes school readiness by enhancing the social and cognitive development of children through the provision of educational, health, nutritional, social and other services to enrolled children and families (8).

Because we typically see health and education-related disparities in children from low income families, 90% of the spaces in the Head Start program are reserved for children whose family income falls below the federal poverty line. Children participating in Head Start attend “preschool” for half or whole days, and in some cases, in the evening.

Children are provided with snacks and meals while attending Head Start preschool. In 2005, Head Start provided services to over 900,000 preschool-aged children nation-wide, spending over 6.8 billion dollars. In Virginia, Head Start served 13,696 children, with a budget of 98.8 million dollars (9). Because the Head Start program serves so many preschool-aged children nation-wide, it is the ideal setting for a program targeting child food behaviors. This project was conducted utilizing the Food Friends program, which was carried out in Head Start classrooms throughout the state of Virginia in the Spring of 2007.

FOOD FRIENDS PROGRAM

In order to address many of the concerns highlighted throughout this review of literature, Johnson and colleagues (33) have extensively worked with and studied Food Friends. This twelve-week social marketing program consists of various hands-on nutrition activities, food-related children's stories and opportunities for children to try "novel" foods. Food Friends was developed by the Colorado Nutrition Network in 1997 to promote healthful food choices and acceptance of novel foods among low-income Coloradans (34).

Food Friends was first pilot-tested in 2000. Food frequency questionnaires were distributed to 67 parents of preschool-aged children in the state of Colorado during a Head Start parent meeting in order to determine which foods would be "novel" for children. A food was considered "novel" if > 85% of parents reported that their child had eaten the food less than four times in their life. Focus groups were utilized as well, in order to develop the program that was appropriate for the desired target audience.

Once the program plan was in place, it was pilot-tested using four Head Start centers, two urban and two rural, with one of each as the experimental sites and one of each as the control sites. At the experimental sites, the entire twelve-week Food Friends program was conducted, whereas at the control sites, only basic nutrition education required by Head Start was given. Over the course of twelve weeks, two novel foods, Daikon Radish and Gouda Cheese, were each given to children once a week to eat as "indicator" foods to determine if repeated exposures to a novel food increased its acceptability. Eleven other foods including beets, buttermilk, couscous, dried currants, garbanzo beans, jicama, parsnips, persimmon, tempeh and wasa bread were given once

throughout the course of the program in order to give children the opportunity to explore, taste and eat more new foods in a supportive environment. One storybook was read and one nutrition-related activity was conducted by Head Start teachers each week.

Examples of activities that were conducted include “Food Friends Memory Card Game,” “Edible Food Faces,” which allowed children to be creative and artistic with food, “Ollie Says,” which is similar to “Simon Says,” and “Fruit and Vegetable Mystery Bags,” which gave the children an opportunity to explore many types of novel foods with their various senses. Newsletter articles were written to provide reinforcement of program goals with parents of the children.

Prior to implementing the pilot-study, children in all four classrooms were given a food preference assessment to determine their willingness to try new foods and to determine their preference for a panel of both familiar and novel foods. Teachers were trained to observe and track childrens’ reactions to trying the new foods throughout the program, including the recording of behaviors such as touching, smelling, playing with and putting the food in the mouth and swallowing or spitting it out.

Teachers were also given the opportunity to provide input related to the appropriateness and effectiveness of the various components of the Food Friends program. Teachers completed questionnaires after six weeks of the program and at the end of twelve weeks. They were asked to reflect on which activities they liked the most/least, ease/difficulty of conducting activities, their children’s enthusiasm towards the program and the overall ability of the program to accomplish its goal of promoting the trying of novel foods.

Results of the Food Friends pilot-study showed two significant differences between the experimental and control groups. First, children in the experimental group were much less likely to refuse novel foods at the end of the intervention than children in the control group (1 vs 10 refused, $P < 0.05$). Second, children in the experimental group reported liking the novel food, daikon radish, more than children in the control group (64% vs 25%, $P < 0.05$). Tracking of child food behaviors also proved that the program was effective over twelve weeks in promoting consumption of novel foods, as children in the experimental group were seen to move from touching, smelling and playing with food to swallowing food more often in the later weeks. Teacher surveys showed that overall the program was rated between 4.1 to 4.9 out of 5 possible points (5=high).

Because of the obvious success that the Food Friends program experienced, it was extended to 225 Colorado Head Start classrooms during the 2004 school year, reaching 4641 children and parents (35). After three years of success in Colorado, the Food Friends program was brought to Head Start classrooms in Virginia, only the second state in the country to use this social marketing campaign.

SUMMARY

During preschool years, children experience rapid growth and development. This period of time is also critical in the development of food preferences. Proper nourishment, including sufficient servings of each food group, and adequate variation within each group is imperative.

By today's standards of "variety," it appears that American preschool-aged children's diets are improving and are getting closer to meeting the recommendations of the USDA. However, our society may be shifting from a state of under-consumption to a state of over-consumption by choosing foods that are higher in "discretionary calories," such as added sugars and fats. American diets seem to be increasing in only a few categories—grains (not necessarily whole), meats/beans and fruit juices. Dietary variety does not seem to be increasing. We are seeing dramatic increases in the rates of child overweight. It is speculated that, due in part to dietary shortcomings, this generation will have a shorter lifespan than their parent's generation (36).

Focusing on dietary variety and lean/less processed food choices will be imperative for the health of future generations, therefore it is easy to see why one of the messages that is emphasized in the new MyPyramid is not only to get enough servings of each food group, but also to make healthy choices within each group (2). Because so many food preferences are developed during preschool years, we must work to increase dietary variety in this population.

It is not enough to simply set guidelines and hope that Americans catch on and make dietary improvements. Rather, through an understanding of what may influence Children's dietary behaviors, we should intervene to increase dietary variety at a young

age. Research has shown that genetics and an inborn preference for sweet and salty foods versus rejection of bitter and sour foods may preclude children to neophobia during preschool years. Research has also found that through modifications in a child's environment, new dietary habits can be learned. Peers, parents and teachers alike may play important roles in motivating a child to try novel foods.

There is very little research looking at potential effects of teacher modeling on childrens' food-related behaviors, with virtually no research on the effect of teacher food-related attitudes on their class' food-related behaviors and acceptance of novel foods. This study will aim to determine whether or not teacher attitudes toward food affect child food behaviors and acceptance of novel foods during the implementation of a 12-week Food Friends social marketing campaign with a "try new foods theme."

CHAPTER 3: MANUSCRIPT

INTRODUCTION

Childhood is a very important developmental period when adequate nutrient intake is imperative. Healthful eating habits in childhood are linked to optimal growth, development, learning, and possibly reduction of chronic disease risk (1). In order to ensure that children are getting the nutrients they need, they must be provided with, and consume, a variety of foods from each food group. According to the MyPyramid guidelines, two- to five-year old children should consume five ounces of grains, 1.5 cups of vegetables, 1.5 cups of fruits, 2 cups of milk and four ounces of meats/beans each day (2). Further, the United States Department of Agriculture (USDA) recommends to “make half of your grains whole,” and to “vary your veggies,” by including dark green and orange vegetables in the diet (2).

In some respects, preschool-aged childrens’ diets appear to be more nutritionally adequate today when compared with childrens’ diets from the 1970’s (3). However, this apparent improvement comes along with increased consumption of fruit juices, added sugars, and overall increased caloric intakes, and may not necessarily reflect better variety, especially of fruits and vegetables. According to a government report published in 2001 (4), only 36% of two- to three-year old children were found to have a “good” diet, and only 17% of four- to six-year old childrens’ diets were classified as “good,” based on the USDA’s Healthy Eating Index (HEI) scoring system. More recently, a study conducted by Langevin and colleagues (5) found that urban children living in a low socioeconomic neighborhood were especially “at risk” for having poor dietary quality.

The study found that, of 193 participants, 75% failed to meet USDA recommendations for grains, vegetables, dairy and fruit groups, greater than 25% of participants did not meet the recommended intakes for folate and iron, and greater than 75% of participants did not meet the recommended intakes for calcium.

One factor that may limit the dietary variety in preschool-aged children is the fact that two- to five-year old children go through a normal developmental phase called “neophobia,” or fear of trying new foods. This phase may frustrate or baffle parents and caregivers who may react by providing a more limited variety of foods that the child is known to eat, eat rather than attempting to expand their child’s food preferences. Research has found, however, that by repeatedly offering a new food to a child, the child may be more likely to accept it as it becomes more familiar to them (6). Children respond best to novel foods when they are presented repeatedly (eight to twelve times), in a positive and supportive environment (7). Adult figures, namely parents and teachers, play a critical role in encouraging acceptance of new foods and, in turn, expanding a child’s dietary variety and nutrient intake. The aim of this study is to determine what, if any, impact a teacher’s attitude towards food has on a child’s acceptance of novel foods. The hypotheses are 1) teachers’ behaviors and attitudes toward trying new foods will influence children’s food behaviors, 2) teachers’ attitudes and behaviors toward trying new foods will improve after the 12-week Food Friends program, and 3) teachers will report improved student dietary behaviors as a result of conducting the 12-week Food Friends program.

METHODS

PARTICIPANTS

177 Head Start teachers were recruited by seven Virginia Family and Consumer Sciences (FCS) Extension Agents to participate in the study. Teachers were recruited as part of a larger project involving the delivery of the 12-week Food Friends social marketing campaign. Teachers were located throughout the state of Virginia and were representative of various demographic groups in Virginia. All teachers completed a three hour training on the Food Friends program prior to its start. Voluntary consent was obtained from all participants. Participants who completed all surveys received a \$20 gift certificate. This study received approval from Virginia Polytechnic Institute and State University's Institutional Review Board.

OVERVIEW OF FOOD FRIENDS 12-WEEK CURRICULUM

Food Friends is a 12-week social marketing program that was carried out in the state of Virginia during the Spring of 2007. Head Start teachers were recruited by Extension Agents, based on individual interest in the program. Food Friends began in the month of February and ended in the month of May. All of the participating Extension Agents were given four hours of training on the Food Friends program during the months of November 2006 and January 2007. They were then provided with resources to train participating Head Start teachers during a routine in-service.

Over the course of the program, teachers presented novel foods to their children three times each week. Children received gouda cheese and daikon radish every week, as repetitive exposure of these foods was meant to encourage the children to be more open and receptive to trying other novel foods. Children also received one other novel food

per week. Teachers were instructed to try each food themselves, if possible (barring absolute disgust for the item or a food allergy), prior to giving it to their children. They were also instructed to be positive about the food, or at least remain neutral.

Along with sampling novel foods, teachers were to read one nutrition-related book and conduct one nutrition-related activity each week, included as part of the Food Friends project. There was an optional schedule that teachers could follow, or if they desired, they could choose which activities they wanted to do from week to week.

SURVEYS CONDUCTED

Teachers completed a total of four surveys, three to capture their own attitudes and behaviors and one about their children's behaviors. The Food Neophobia Pre-Survey and Teacher Taste Test Record were completed prior to the start of the program and as part of the initial Food Friends training. The Food Neophobia Post-Survey and Children's Taste Test Record were completed at the conclusion of the program.

Food Neophobia Pre-Survey. The pre-survey, adapted from an earlier version used in Colorado (8), was designed to obtain a baseline estimate of teacher experiences with food throughout life and their current attitudes and behaviors related to food. The pre-survey was conducted with each teacher prior to initiation of the program to assess demographic information, dietary attitudes and dietary behaviors. Demographic information included age, length of time as a preschool/Head Start teacher, education level, race and number/age of children living with each participant. Questions on dietary attitudes and behaviors covered the following topics: the way teachers were fed as a child, family mealtime perceptions, teacher's role in influencing students and current eating habits.

Fifteen questions were asked relating to the way each participant was fed when they were a child such as “Adults used food to get me to do things” and “I was allowed to choose which foods I ate at meals.” Responses included “never,” “rarely,” “some of the time,” “most of the time,” or “always.” Teachers were asked one question related to the pleasantness or unpleasantness of their family mealtimes when they were growing up, as well as a question as to whether or not they were trying to lose weight during the Food Friends program. Nineteen questions were asked related to current eating habits including “I am a picky eater” and “I eat until I am too full.” Responses included “never,” “rarely,” “some of the time,” “most of the time,” or “always.” Finally, three questions were asked about teachers’ perceptions of their role in influencing their students’ food behaviors—“What I eat influences what the children in the classroom eat,” “How I react to food influences what the children eat,” and “If I won’t try a food, then the children probably won’t try it either.” They could answer “strongly disagree,” “disagree,” “neither agree nor disagree,” “agree,” or “strongly agree.”

Teacher Taste Test Party Record. As part of the program training, teachers were asked to participate in a taste test similar to the one conducted with children during the Food Friends program. The foods presented for the “Teacher Taste Test Party” were gouda cheese, daikon radish, couscous, wasa bread (alternatives were melba, rye or pita), buttermilk (alternatives were soy milk or goat’s milk), jicama (alternative was water chestnuts), ugli fruit (alternatives were pomellos or mandarin oranges), parsnips (alternative was beets), dried currants (alternatives were lychees or dried figs), tempeh (alternative was tofu), and garbanzo beans. Following the taste test, a teacher taste test survey was conducted to assess each teacher’s level of exposure to certain unique foods

and each teacher's comfort level with trying different foods. The goal was to assess teachers' attitudes and behaviors toward "new" foods that would later be offered to their children during the Food Friends campaign. Teachers were asked if they had tried each of the foods anytime in their life or not. Then after they tasted each food, they were asked to indicate if they liked it, with responses being "I liked it," "I didn't like it," or "I didn't try it"). Finally, participants were asked to place an "X" on a 100mm line indicating how trying new foods makes them feel, where far left meant "Extremely nervous or anxious" and far right meant "Not at all nervous or anxious."

Food Neophobia Post-Survey. The post-survey was completed by all teachers upon completion of the program. Part One of the post-survey asked teachers to evaluate the Food Friends program. They were asked to list all of the Food Friends activities that they did with their classroom. They were then able to share comments regarding which activities were most enjoyable to do with the children, least enjoyable to do with the children, and which they felt were most successful in teaching the children about new foods. They could comment on which activities the children seemed to like the most and the least and describe any particular problems they might have had during the program. There were several questions related to the ease or difficulty of conducting the program and the teachers' perceptions of child enthusiasm and participation throughout the program. Teachers also rated each novel food in the program on a scale from one to five, with one being "not new at all" and five being "very new/never tried." Finally, teachers were asked about which of their food habits and their own preschool-aged children's food habits (if they have any), improved after the Food Friends program. The results of this component of the study will not be reported here.

The second part of the post-survey included the same questions as the pre-survey related to the teachers' current eating habits and teacher attitudes about their role as a teacher on influencing their students' attitudes towards food.

Children's Taste Test Party Record. At the end of the Food Friends program, each teacher was expected to host a "Children's Taste Test Party," in which children were presented with two familiar foods (peaches and O shaped cereal), two indicator foods that were used throughout the course of the program (gouda cheese and daikon radish), and two completely novel foods (okra and garbanzo beans). Teachers observed and recorded each child's reaction to the foods as "I liked it," "I didn't like it," or "I didn't try it."

DATA ANALYSIS

A total of 177 pre-surveys, 176 teacher taste test party sheets, 151 post-surveys and 113 children's taste test party sheets were returned by participating teachers. All information pertaining to teacher demographics were entered into Microsoft Excel, copyright 2003, and analyzed using descriptive statistics. Three hypotheses were tested using responses from the surveys and taste tests.

The first hypothesis that teachers' behaviors and attitudes toward trying new foods would influence children's food behaviors, was tested by analyzing three variables: teacher food behaviors; teacher attitudes related to food neophobia; and teacher attitudes related to influencing child food behaviors.

Each teacher was given a food neophobia behavior score based on their actions during the Teacher Taste Test Party. All information from the Teacher Taste Test Party Record was reviewed, and the number of times that a teacher who "had not tried" a food

subsequently “didn’t try” the food was tallied, along with their anxiety score for trying new foods, to provide an overall food neophobia behavior score for each teacher.

Neophobia behavior scores could range from 0-12, based on the number of foods rejected by teachers. Pearson correlations were used to determine the associations between teacher food neophobia behavior scores and the number of children in their class who did or did not try the novel foods during the Children’s Taste Test Party.

Second, results from ten questions on the Food Neophobia Pre-Survey (scored from 1-5) related to teacher food neophobia attitudes were tallied. Several of the responses had to be reverse coded to be consistent. Pearson correlations were used to determine the associations between the total score from Food Neophobia Pre-Survey questions related to teacher food neophobia attitudes (10-50 possible points) and the number of children in each class who did or did not try the novel foods during the Children’s Taste Test Party.

Third, teacher attitudes regarding ability to influence child food behaviors were assessed, based on the three core questions from the pre-survey, and compared to the number of children in each class who did or did not try the novel foods during the Children’s Taste Test Party.

The second hypothesis that teachers’ attitudes and behaviors toward trying new foods would improve after the 12-week Food Friends program was tested in two ways. First, the question “Now after completing Food Friends, which of the following habits do you think have improved? (Check all that apply)” was analyzed using descriptive statistics. Analysis focused strictly on the percent of teachers who reported one or more of the following answers: “You, personally, try more ‘new foods’ now,” “You,

personally, eat more fruits and vegetables now,” and “You, personally, eat a wider variety of foods now.” Second, paired t-tests were used to compare teacher responses for the ten core questions related to food neophobia from pre- to post-surveys.

The third hypothesis that teachers would report improved student dietary behaviors as a result of conducting the 12-week Food Friends program was tested by one question on the Food Neophobia Post-Survey. The question “Now after completing Food Friends, which of the following habits do you think have improved among your children? (Check all that apply)” was answered by teachers and analyzed using descriptive statistics. Analysis focused strictly on the percent of teachers who reported one or more of the following answers: “The children eat ‘new foods’ now,” “The children eat more fruits and vegetables now,” and “The children eat a wider variety of foods now.”

RESULTS

TEACHER INFORMATION

A total of 177 Head Start teachers/teaching assistants participated in the Food Friends program out of 1528 teachers in the state of Virginia. General demographic information can be found in Table 1. The average age of teachers was 39.5 years, over 80% of participating teachers had their own children, nearly all of the teachers completed high school, and greater than one-third of the teachers held a Bachelor’s Degree or higher. Of these teachers, 177 returned Food Neophobia Pre-Surveys (100% response rate), 176 participated in the Teacher Taste Test Party (99.5% response rate), 151 returned Food Neophobia Post-Surveys (85.3% response rate) and 113 returned

Children’s Taste Test Party Records (63.8% response rate). No significant differences were noted between those teachers who filled out only pre-surveys versus those who filled out both pre- and post-surveys.

Table 1: Demographic Information for Participating Head Start Teachers

Categories	Teachers Who Submitted Pre-Survey Only (n=177)	Teachers Who Submitted Pre- and Post Surveys (n=142)
Average Age (years)	39.5 ± 10.0	39.5 ± 9.9
Length of time with Head Start (years)	7.2 ± 6.9	7.6 ± 6.8
Length of time as Preschool Teacher (years)	9.9 ± 7.8	10.4 ± 7.8
Education Level		
Completed High School	175 (98.9%)	141 (99.3%)
Associate’s Degree	47 (26.6%)	38 (26.8%)
Post High School Ed/No Degree	52 (29.4%)	37 (26.1%)
Bachelor’s Degree or Higher	65 (36.7%)	58 (40.8%)
Children at Home	145 (81.9%)	114 (82.0%)
Race		
White	89 (50.3%)	80 (58.8%)
Black	77 (43.5%)	53 (39.0%)
Other	3 (1.7%)	3 (2.2%)
Hispanic/Latino	8 (4.5%)	7 (5.1%)

Out of a possible 25 nutrition-related Food Friends activities, teachers conducted an average of 14 activities, with a range of 3 to 25 activities presented over the 12-week period. There was a significant relationship between the number of activities conducted and the acceptance of Daikon radish during the Children’s Taste Test Party ($p < 0.05$), however this relationship was not found with any of the other foods presented.

TEACHER ATTITUDES AND BEHAVIORS TOWARD TRYING NEW FOODS

Novelty of Food Friends foods. Although foods for the Food Friends program were chosen because they were reimbursable by Head Start and because of their novelty in

Colorado (8), the majority of participating Head Start teachers in the state of Virginia found the foods novel as well. According to teacher responses on the Food Neophobia Post-Survey, seen in Table 2, Daikon radish, tempeh, couscous, and jicama were the most novel in our teachers’ opinions. Ninety-seven (97.3%) percent, 95.9%, 95.5% and 94.7% of teachers classified them as “very new,” respectively. Parsnips, ugli fruit and dried currants were considered the least novel with 71.9%, 78.4% and 79.9% classified as “very new,” respectively.

Table 2: Novelty of Foods Used in Program

Food Item	Not New (1-3)* n (%)	Very New (4/5)* n (%)
Gouda cheese	14 (9.1%)	140 (90.9%)
Daikon radish	4 (2.6%)	150 (97.3%)
Couscous	7 (4.5%)	147 (95.5%)
Wasa bread (melba, rye, pita)**	25 (16.7%)	125 (83.3%)
Buttermilk (soy milk, goat’s milk)**	23 (15.1%)	129 (84.9%)
Jicama (water chestnuts)**	8 (5.3%)	142 (94.7%)
Ugli fruit (pomellos, mandarin orange)**	25 (21.6%)	91 (78.4%)
Parsnips (beets)**	41 (28.1%)	105 (71.9%)
Dried currants (lychees, dried figs)**	31 (20.1%)	123 (79.9%)
Tempeh (tofu)**	6 (4.1%)	142 (95.9%)
Garbanzo beans	18 (12.1%)	131 (87.9%)

**Questions were scored on a scale of 1-5 with “1” meaning “Not new at all” and “5” meaning “Very new/never tried”*

***If a particular food was not available, substitutes were allowed, as shown in parentheses.*

Teachers’ reports of Food Friends foods tasted. As part of teacher training and preparation, Extension Agents held a taste test party for teachers. Teachers had the opportunity to try all of the Food Friends foods. A total of 176 teachers participated in the Teacher Taste Test Party during Food Friends training. On a scale of 0-100, with “0” being “extremely nervous or anxious” and “100” being “not nervous or anxious at all,” the Head Start teachers reported an average of 72.8 for their anxiety level while trying

new foods, indicating a high comfort level with novel foods. The most tasted foods during the tasting party were Gouda cheese, wasa bread and ugly fruit. Ninety-seven (97.5%) percent, 96.8% and 96.5% were tasted, respectively. The least tasted foods were buttermilk, tempeh and couscous with 71.7%, 78.8% and 83.9% tried, respectively. (See Table 3)

Teacher responses to food neophobia questions. Table 4 shows the responses for each of the questions teachers were asked related to their food neophobia attitudes in the Food Neophobia Pre- and Post-Surveys. In general, teachers tended to have more neophilic than neophobic food attitudes, with close to half of respondents considering themselves either never or rarely to be a picky eater, and over half of respondents reporting that they never or rarely don't trust new foods. However, when looking at the Teacher Taste Test Record, it seems that food neophobia was present at times, with 29.3% of teachers not trying buttermilk, 21.2% not trying tempeh, and 16.1% not trying couscous.

Table 3: Teachers' Reports of Foods They Tried During Training

Food	I liked it n (%)	I didn't like it n (%)	I didn't try it n (%)
Gouda cheese	139 (86.3)	18 (11.2)	4 (2.5)
Daikon radish	80 (58.4)	39 (28.5)	18 (13.1)
Couscous	83 (55.7)	42 (28.2)	24 (16.1)
Wasa bread (melba, rye, pita)	113 (71.5)	40 (25.3)	5 (3.2)
Buttermilk (soy milk, goat's milk)	32 (21.3)	74 (49.3)	44 (29.3)
Jicama (water chestnuts)	84 (62.2)	41 (30.4)	10 (7.4)
UGLI fruit (pomellos, mandarin oranges)	129 (90.0)	11 (7.6)	5 (3.5)
Parsnips (beets)	93 (61.6)	46 (30.5)	12 (8.0)
Dried currants (lychees, dried figs)	125 (81.2)	18 (11.7)	11 (7.1)
Tempeh (tofu)	25 (16.6)	94 (62.2)	32 (21.2)
Garbanzo beans	81 (55.1)	47 (32.0)	19 (12.9)

Table 4: Teachers' Food Neophobia Attitudes (Range 0-4)

Question/Response	Never(0) n(%)	Rarely(1) n(%)	Sometimes(2) n(%)	Frequently(3) n(%)	Always(4) n(%)	Average Score
<i>I am a picky eater</i>	35 (21.5)	40 (24.5)	53 (32.5)	19 (11.7)	16 (9.8)	1.60 ± 1.18
<i>I am constantly sampling new and different foods</i>	10 (6.2)	39 (24.1)	65 (40.1)	34 (21.0)	14 (8.6)	1.95 ± 1.02
<i>I don't trust new foods</i>	32 (20.0)	49 (30.6)	60 (37.5)	16 (10.0)	3 (1.9)	1.45 ± 1.23
<i>If I don't know what is in a food, I won't try it</i>	9 (5.5)	37 (22.4)	75 (45.5)	23 (13.9)	20 (12.1)	2.01 ± 1.03
<i>I like foods from different countries</i>	3 (1.8)	26 (16.0)	70 (42.9)	48 (29.4)	16 (9.8)	2.25 ± 0.92
<i>Ethnic food looks too weird to eat</i>	32 (20.0)	41 (25.6)	74 (46.3)	8 (5.0)	5 (3.1)	1.44 ± 0.94
<i>At dinner parties, I will try a new food</i>	5 (3.0)	17 (10.2)	80 (48.2)	39 (23.5)	25 (15.1)	2.34 ± 0.95
<i>I am afraid to eat things I have never had before</i>	31 (19.1)	36 (22.2)	74 (45.7)	14 (8.6)	7 (4.3)	1.55 ± 1.00
<i>I am very particular about the foods I will eat</i>	17 (10.6)	33 (20.5)	67 (41.6)	24 (14.9)	20 (12.4)	1.95 ± 1.10
<i>I will eat almost anything</i>	23 (14.1)	42 (25.8)	45 (27.6)	40 (24.5)	13 (8.0)	1.82 ± 1.14

Questions 27, 30, 32 and 35 were reverse coded for the calculation of teacher food neophobia attitude scores

CHILDREN'S BEHAVIORS TOWARD TRYING NEW FOODS

Responses from Children's Taste Test Party Record. At the conclusion of the Food Friends program, a total of 1534 children participated in a Children's Taste Test Party. During this taste test party, children were presented with two common foods, peaches and O shaped cereal, in order to assess their general mood towards eating foods at that time. They were given the two indicator foods, Gouda cheese and Daikon radish, which they had been receiving each week during the Food Friends program. Then they were given two completely novel foods, garbanzo beans and okra to test their response to trying

novel foods. As expected, over 98% of children tried the “common foods.” Most children tried the “indicator foods,” with 95.8% trying Gouda cheese and 89.3% trying Daikon radish. Finally, 81.7% of children tried garbanzo beans and 66.3% tried raw okra. Table 5 provides complete information regarding the number of Children who “liked,” “didn’t like” or “didn’t try” each food.

Table 5: Teachers’ Observations of Children’s Behavior During Taste Test Party

	Common Foods		Indicator Foods		Novel Foods	
	<i>Peaches n(%)</i>	<i>O Cereal n(%)</i>	<i>Gouda Cheese n(%)</i>	<i>Daikon radish n(%)</i>	<i>Okra n(%)</i>	<i>Garbanzo Beans n(%)</i>
“Liked it”	1368 (92.2%)	1448 (97.3%)	1340 (87.4%)	838 (56.7%)	405 (31.8%)	694 (48.0%)
“Didn’t like it”	90 (6.1%)	33 (2.2%)	128 (8.3%)	481 (32.6%)	440 (34.6%)	488 (33.7%)
“Didn’t try it”	26 (1.7%)	7 (0.5%)	65 (4.2%)	158 (10.7%)	427 (33.6%)	265 (18.3%)

Student changes in behavior. Teachers reported positive changes in child dietary behaviors at the conclusion of the Food Friends program. Eighty-three (83.5%) percent of teachers reported that children try more new foods outside of Food Friends, 49.0% of teachers reported that children eat more fruits and vegetables now, and 63.5% of teachers reported that children ate a wider variety of foods.

INTERACTION BETWEEN TEACHER ATTITUDES AND BEHAVIORS AND CHILDREN’S BEHAVIORS

Overall, it was found that teacher behaviors and attitudes toward trying new foods did not influence children’s food behaviors over the course of the Food Friends program. For all three measures of analysis, there were no significant findings.

Teacher food neophobia behavior scores, as measured by the number of times a teacher did not try a food during the Teacher Taste Test Party that they had not tried previously in their lifetime, were not correlated with what children tasted during the Children's Taste Test Party ($p=0.973$). The average number of rejections for previously untried foods was 0.76 ± 1.74 foods per teacher, with anywhere from zero to nine food rejections for an individual.

Teacher attitudes related to food neophobia including self-ratings of picky eating, like/dislike of new and different foods, and acceptance or rejection of ethnic foods (Table 4), were not correlated with children's rejections of food during the Children's Taste Test Party ($p=0.359$). On a scale of 0-40, with "0" equating to a highly food neophobic attitude and "40" equating to a highly food neophilic attitude, the average teacher score was 17.9 ± 7.35 , with a range of 5-39 for an individual.

Teacher perception of their ability to influence child food behaviors, as measured by three questions on the Food Neophobia Pre-Survey, seen in Table 6, was not correlated with the results of the Children's Taste Test Party ($p=0.706$). On a scale of 0-12, with "0" being no influence on child food behavior and "12" being significant influence on child food behavior, the average teacher's perception score was 9.18 ± 1.03 , with a range of 0-12 for an individual.

Based on a paired t-test analysis of questions on the Food Neophobia Pre- and Post-Surveys, although teacher attitudes towards their ability to influence child food behaviors were generally positive, no significant changes were found in teacher attitudes after conducting the Food Friends program. Questions related to teachers' perceived influences were answered on a scale of zero to four, with zero being "strongly disagree"

and four being “strongly agree.” (Table 6) For the statement “What I eat influences what the children in the classroom eat,” the average response was 2.90 ± 1.07 before the program and 3.00 ± 1.00 after ($p=0.442$). For the statement “How I react to food

Table 6: Teachers’ Attitudes Toward Ability to Influence Child Food Behaviors

Question/ Response	Strongly Disagree (0), n(%)	Disagree (1) n(%)	Neither Agree nor Disagree (2), n(%)	Agree (3) n(%)	Strongly Agree (4), n(%)	Average Score
<i>What I eat influences what the children in the classroom eat</i>	10 (5.9)	6 (3.6)	28 (16.7)	75 (44.6)	49 (29.2)	2.90 ± 1.00
<i>How I react to food influences what the children eat</i>	6 (3.6)	6 (3.6)	6 (3.6)	82 (48.5)	69 (40.8)	3.21 ± 0.93
<i>If I won’t try a food, then the children probably won’t try it either</i>	7 (4.1)	8 (4.7)	28 (16.6)	67 (39.6)	59 (34.9)	2.97 ± 1.04

influences what the children eat,” the average teacher response was 3.21 ± 0.93 before and 3.2 ± 0.9 after ($p=0.507$). For the statement “If I won’t try a food, then the children probably won’t try it either,” the average teacher response was 2.97 ± 1.04 before and 2.94 ± 1.12 after ($p=0.273$).

Teachers’ attitudes and behaviors toward trying new foods as a result of the program. Teachers’ attitudes and behaviors toward trying new foods did improve in several key areas after conducting the 12-week Food Friends program. According to teacher responses on the Post-Survey, 70.1% reported that they personally try more new foods now, 48.7% report eating more fruits and vegetables and 45.9% report eating a wider variety of foods. Results from paired t-tests related to food neophobia from before

to after the program found significant positive changes in teacher response to the statements: “If I don’t know what’s in a food, I won’t try it”(p=0.008); and “I am afraid to eat things I’ve never had before” (p=0.013).

DISCUSSION

Data collected from this study demonstrated that there was no significant evidence to support the hypothesis that teacher behaviors and attitudes toward trying new foods influence children’s food behaviors, at least in this particular setting. Regardless of teacher food neophobia behaviors, teacher food neophobia attitudes and teacher confidence in their ability to influence child food behaviors, no significant impacts were seen with child food behaviors during the Children’s Taste Test Party.

Although teacher attitudes toward their ability to influence child food behaviors were not found to improve after conducting the Food Friends program, this may have been due to a “ceiling effect.” The average response for the three questions pertaining to teacher ability to influence their children on the Food Neophobia Pre-Survey was 3.03 ± 0.98 , while the average for the same questions on the Food Neophobia Post-Survey was 3.05 ± 1.00 on a scale of 0-4. This indicates that teachers already “agreed” or “strongly agreed” that they could influence children in the Pre-Survey, so realistically their responses could not have improved by much in the Post-Survey.

There are a number of limitations for this study. First, despite the fact that parents have a significant influence on their child’s development, including development of food attitudes and behaviors, information was not gathered regarding parental influences during this study. In many studies, parent variables are not directly assessed—only the

impacts on children of the intervention with or without a parent component (9). This may be due to the difficulty of gathering representative family information in a community setting.

Another potential limitation was the fact that we did not observe the type of teacher modeling that was done during presentation of new food items. Although teachers were encouraged to either remain neutral or positive when presenting new foods to their class, teacher modeling could have fallen anywhere along a spectrum from silent modeling, which has been shown to be relatively ineffective in prompting children to try a novel food to loud, enthusiastic encouragement and praise, which has been shown to be relatively more effective in promoting the sampling of a novel food (10).

Another issue with this study is that there may have been certain group dynamics between children in the preschool classrooms that were unaccounted for. These potential dynamics may have either positively or negatively affected the children's taste test party results. For example, if one child seen as "popular" chose not to eat a certain food, his action may persuade other children to behave in a similar fashion. As Hendy and colleagues showed, peer modeling is a powerful tool, and may even trump modeling done by adults when it comes to food behaviors (11).

Utilizing Extension Agents as "middlemen" for our research was another limitation. Although all Extension Agents were trained in the same manner, significant variation was found in the ways that each group of teachers filled out surveys and taste party results. Also, although surveys were coded to prevent mismatching, a few of the Extension Agents turned in teacher surveys that were not matched up correctly. This type of human error may cause some discrepancy in interpreting results of the study.

Many of the teachers mentioned that the novel foods used in the program were too expensive. Because this program was conducted with children in the Head Start population, who come from low-income families, it is true that they may not be able to afford gouda cheese and other specialty food items. However, it was not the aim of this program to encourage the specific foods provided, but rather to expose children to foods that they may not have experienced before.

Child temperament could have played a large role in their participation with the Children's Taste Test Party as well. Temperament was controlled for by presenting children with familiar foods (peaches and O shaped cereal), indicator foods (Gouda cheese and Daikon radish) and the novel foods (garbanzo beans and okra). There was a significant correlation between children who rejected the indicators and also rejected the novel foods ($p < 0.001$), and there was a trend towards correlation between children who rejected familiar foods and also rejected the novel foods ($p = 0.06$). This data suggests that perhaps some of the children who rejected novel foods during the Children's Taste Test Party were simply in a bad mood that day, and their participation might not be indicative of their normal food behaviors.

Although the limitations of this study are numerous, there are also significant strengths. Extension Agents successfully recruited and retained 142 teachers. There was a high rate of participation from Head Start teachers throughout the program, with response rates of greater than 85% for both the Food Neophobia Pre- and Post-Surveys. Another strength is that Food Friends foods which were chosen based on their novelty in the state of Colorado (8) were also viewed as very novel by teachers in the state of Virginia, therefore having the desired program impact on children.

Even though teacher attitudes and behaviors toward trying new foods were not found to influence child food behaviors, their attitudes and behaviors did improve significantly after conducting the Food Friends program. More than 70% of teachers reported that they now try more new foods, outside of the program, than they did before, and almost 50% reported eating more fruits and vegetables and a wider variety of foods after conducting the program. This program also appeared to decrease teacher food neophobia, as fewer teachers were found to agree with the statements “If I don’t know what’s in a food, I won’t try it,” and “I am afraid to eat things I’ve never had before” ($p=0.008$, $p=0.013$).

IMPLICATIONS FOR RESEARCH AND PRACTICE

As the rate of child overweight continues to rise, effective intervention strategies which promote a healthy and varied diet will be essential for prevention of chronic diseases in our children. Many factors play into a child’s development of food behaviors, including their environment and the many influences therein. Although this study did not find a correlation between teacher food behaviors and attitudes and the food behaviors of their children, more research is needed before the influence of teachers can be dismissed.

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CHAPTER 4: SUMMARY, IMPLICATIONS FOR FUTURE RESEARCH, AND CONCLUSIONS

Several notable strengths were found for this study. There was a high response rate to all surveys and a low rate of dropouts. Perhaps this can be attributed in part to the fact that teachers overwhelmingly reported enjoyment of the Food Friends program for themselves and their children. Activities such as the puppet shows and food tasting opportunities were very well-received, and according to comments made in the post-surveys, the teachers liked how easy the program was to implement, with all materials and lesson plans supplied and outlined for them. Teachers were also compensated with a \$20 gift card for completing all of the surveys, and they were able to keep all of the Food Friends materials, such as puppets and story books, for future use in their classroom.

Several challenges arose while conducting this study as well. First, although there is a significant amount of literature regarding development of child food preferences, there is little research in the area of teacher modeling and food behaviors; only a handful of studies were found, including those performed by Hendy (25,32) and Addressi (31). Even more significant was the paucity of studies examining the potential impact of teacher attitudes toward health on children in their classrooms. Considering the fact that attitude is an important component in numerous behavioral models (Theory of Reasoned Action/ Planned Behavior, Health Belief Model, etc), one would assume that it would be examined more thoroughly during health studies and interventions, but this was not found to be the case. Perhaps it is not frequently examined because it is assumed that teacher attitudes and behaviors affect the children in their classroom. During implementation of local school wellness policies, mandated by the Child Nutrition and WIC Reauthorization

Act of 2004 (39), for example, teachers are often asked to served as positive role models for their children, although the effect of their positive attitudes and behaviors may not be known, based on past research.

Another significant challenge was the fact that the study was not set up to gather data from children’s parents/guardians. According to Contento, data from parents and guardians is often not collected during child nutrition education research (37), or if collected, it is usually in a simple way, such as counting the number of parents that come to a program, for example. Perry and colleagues (38) also commented that a major dilemma in children’s health promotion is how to involve parents in those efforts.

Based on some of the comments from the teachers who conducted the program, it seemed to be a success overall. The children were enthusiastic throughout the program and related well to the Food Friends characters. Many teachers commented that they appreciated how easy it was to conduct the program, as everything was planned out and provided for them. Because teachers were able to keep all of the materials after the program, they will probably conduct at least some parts of the program again for upcoming years. If Head Start programs in Virginia can build the cost of the “novel” foods into their annual budget, ideally the program could be conducted each year, indefinitely.

IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

Preschool children are at a very impressionable age, and there may be many factors involved in their food choices, including parental and peer influences, genetics, innate food preferences and more (13). With a study of this kind, there are several things that could be done differently in the future. First, periodic observation of teachers during

the implementation of Food Friends could give researchers a better understanding of how foods were presented. This might shed some light on whether or not teacher attitudes come through in their teaching style. Second, gathering of data from parents/guardians could strengthen study results, as parent food-related attitudes and behaviors could be controlled for during analysis of a future study. Third, if the Food Friends program is to be continued outside of Colorado, a questionnaire should be distributed to parents of Head Start children in each new state in order to determine the types of food that would be considered “novel” for children in the state.

An interesting follow up to this study would be to assess what, if any, impact the program had on each child’s family nutrition practices. A post-survey could be sent home to parents or guardians asking first if they received and reviewed the materials which were sent home with the child, and second, about how their own nutrition-related attitudes and behaviors may have changed.

Another interesting study that could stem from this research is to see what kind of impact a farm-to-school experiential learning curriculum could have on acceptance of fruits and vegetables. This type of study would be a logical follow up to the Food Friends program, as fruits and vegetables from the farm, even if they are not “new” to children, may look “new” since they have natural blemishes and are not quite the same standard shape, size and color as those found in stores. Through fun, hands-on activities, children could grow to appreciate and accept fresh, locally grown fruits and vegetables at a young age. Children could take field trips to a local farm and pick fruits and vegetables, and then teachers could help prepare the collected items in a creative way. Also, preschool children might be able to have a small garden outside of their classroom

where they could grow small items such as radishes or carrots, and these hands-on activities might influence the children to accept more fruits and vegetables in the future.

It would be interesting to compare the acceptability of the Food Friends foods in both raw and cooked/processed forms. During Food Friends, teachers were required to present the foods in a completely raw and unadulterated form, so as to avoid variability from classroom to classroom. It has been speculated that, with the addition of a few spices (i.e. turning garbanzo beans into hummus), foods might be more readily accepted by children. Perhaps a study could be conducted with three classrooms: a control, one who gets the normal Food Friends program, and one who gets the Food Friends foods which are cooked and/or seasoned to make them more “appealing.”

Because the Food Friends concept has proven successful in promoting the acceptance of novel foods in all of the venues in which it has been conducted thus far, it makes sense that researchers and educators should work to expand the program’s reach in the future. Options for future Food Friends sessions might include preschool classrooms outside of Head Start or perhaps even preschool and kindergarten classrooms in public schools, as part of the USDA School Breakfast and School Lunch program.

It would be interesting to examine the Food Friends program across various cultural and socioeconomic backgrounds as well. Perhaps children from different cultures, particularly those who have not been fully acculturated to American foods and customs, might react differently to novel foods. Also, we consistently refer to children from lower socioeconomic backgrounds as being “at risk” for malnutrition, but does this necessarily mean they are less willing to eat a variety of foods in their diets? Continuing

research is needed in these areas to answer important questions regarding child food behaviors.

CONCLUSIONS

Overall, the Food Friends program has been shown to be successful in promoting acceptance of novel foods in the preschool population, based on teachers' perspectives (33). The current study's results suggest that Food Friends was also successful in improving teacher food attitudes and behaviors. This study did not show that teacher attitudes and behaviors impact child food behaviors; however, more research is needed in this area before any strong conclusions can be drawn.

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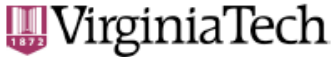
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Appendices




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DATE: January 25, 2007

MEMORANDUM

TO: Elena L. Serrano

FROM: David M. Moore 

Approval date: 9/13/2006
Continuing Review Due Date: 8/29/2007
Expiration Date: 9/12/2007

SUBJECT: IRB Amendment 1 Approval: "Food Friends and Fun Moves", IRB # 06-463

This memo is regarding the above referenced protocol which was previously granted approval by the IRB on September 13, 2006. You subsequently requested permission to amend your IRB application. Since the requested amendment is nonsubstantive in nature, I, as Chair of the Virginia Tech Institutional Review Board, have granted approval for requested protocol amendment, effective as of January 25, 2007. The anniversary date will remain the same as the original approval date.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.
3. Report promptly to the IRB of the study's closing (i.e., data collecting and data analysis complete at Virginia Tech). If the study is to continue past the expiration date (listed above), investigators must submit a request for continuing review prior to the continuing review due date (listed above). It is the researcher's responsibility to obtain re-approval from the IRB before the study's expiration date.
4. If re-approval is not obtained (unless the study has been reported to the IRB as closed) prior to the expiration date, all activities involving human subjects and data analysis must cease immediately, except where necessary to eliminate apparent immediate hazards to the subjects.

As indicated on the IRB application, this study is receiving federal funds. The approved IRB application has been compared to the OSP proposal listed above and found to be consistent. Funds involving procedures relating to human subjects may be released. Visit our website at www.irb.vt.edu for further information

cc: File

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Teacher Food Friends Survey (Pre) Teachers – Please complete BEFORE conducting the 12-week Food Friends program.

As part of the Food Friends project, we are requesting that you fill out this research survey now – before – conducting the 12-week Food Friends campaign and again – after – conducting it. Your responses will help us better understand how childhood experiences are influenced and may shape an adult’s perspectives toward food. Your candid answers will help us adapt, if needed, the Food Friends program. **It should take approximately 20 minutes to fill out.** There are no right or wrong answers. There are no more than minimal risks associated with your participation in this project. There are also no direct benefits for participating in this study. Your answers will be kept confidential/anonymous by the researchers. If you complete this entire questionnaire **AND** the evaluation and survey after the program, **you will receive a gift card for \$20 gift to Wal-mart.**

**Please return to your local FCS
Extension Agent.**

First, tell us a little about yourself.

What is your age? _____ years

How long have you been a teacher for Head Start? _____ years

How long have you been teaching pre-school altogether? _____ years

Education Completed (Please check one)

_____ I have **NOT** received a high school diploma or a GED.

_____ I have a high school degree or a GED

_____ I have a two-year associate degree.

_____ I have education training beyond high school, but I do not have a college degree.

_____ I have received at least one four-year college degree (BA, BS, MS, MA, EdD, PhD)

What are the ages of your own children? Do they live at home? If so, place a check next to "yes"

_____ I do not have children.

_____ years _____ Yes, they live at home.

_____ years _____ Yes, they live at home.

_____ years _____ Yes, they live at home.

_____ years _____ Yes, they live at home.

Are you currently pregnant? _____ Yes _____ No

What race do you consider yourself?

_____ White _____ Black _____ Asian/Pacific Islander

_____ American Indian/Alaskan

Are you Latina(o)/Hispanic? _____ Yes _____ No

Next, we would like to ask you a few questions about how you were fed as a child.

How often were YOU fed in these ways when you were a child? (Please mark one box for each statement)

	Never	Rarely	Some of the Time	Most of the Time	Always
Adults used food as a way to get me to do things.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was allowed to choose which foods I ate at meals.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was required to eat all the food on my plate.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was given dessert after I finished my meal.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adults decided what was offered at meals.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was allowed to decide how much I ate at meals.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adults required me to eat some of each food at meals.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adults offered me food when I was sad...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adults picked on me about my eating.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adults teased me about my weight.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adults gave me food when they were happy with me.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adults talked to be about nutrition.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I served my own food.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was a picky eater.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I ate until I was too full.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Which of the following best describes family mealtimes when you were growing up? (Mark one)

- Tense and unpleasant
- Relaxed and happy
- Neither pleasant nor unpleasant
- I can't say because we did not have family mealtimes very often

Are you trying to lose weight right now? (Mark one)

- Yes
- No

Next, think about how you eat now.

Please mark one box for each statement.

	Never	Rarely	Some- times	Fre- quently	Always
I am a picky eater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat until I am too full.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat until I feel satisfied.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I clean my plate.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat dessert after I finish my meal.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use food to get myself to do things.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat when I feel sad.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I try to control how much I eat to lose weight..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I sometimes feel badly about how much I eat.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am constantly sampling new and different foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't trust new foods.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



	Never	Rarely	Some- times	Fre- quently	Always
If I don't know what is in a food, I won't try it.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like foods from different countries.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ethnic food looks too weird to eat.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At dinner parties, I will try a new food.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am afraid to eat things I have never had before.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am very particular about the foods I will eat.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I will eat almost anything.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to try new ethnic restaurants.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Finally, tell us about what you think about your role as a teacher and how you can influence your students' attitude toward food. Please mark one box for each statement.

	Strong- ly Dis- agree	Dis- agree	Neither Agree or Dis- agree	Agree	Strong- ly Agree
What I eat influences what the children in the classroom eat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How I react to food influences what the children eat (eg. if I make a face).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I won't try a food, then the children probably won't try it either.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

THANK YOU!





Code: _____

Center Name: _____

Food Friends Teacher Taste Test Party (before)
Please return to your FCS Extension Agent.

This taste test party is similar to the one you will be holding with the children in your classroom. We want to know what YOU think about the foods in the Food Friends campaign. Please check the appropriate box for each food. Substitutes are found in parentheses; please answer for the food you tasted during the training.

Food	I have tried it	I have NOT tried it	I don't know
Gouda cheese			
Daikon radish			
Couscous			
Wasa bread (melba, rye, pita)			
Buttermilk (soy milk, goat's milk)			
Jicama (water chestnuts)			
UGLI fruit (pomellos, mandarin orange)			
Parsnips (beets)			
Dried currants (lychees, dried figs)			
Tempeh (tofu)			
Garbanzo beans			

Place an "X" on the line depending on how you feel.

Trying these foods makes me feel...

Extremely
Nervous or Anxious

Not at All
Nervous or Anxious

After tasting the foods...

Food	I liked it	I didn't like it	I didn't try it
Gouda cheese			
Daikon radish			
Couscous			
Wasa bread (melba, rye, pita)			
Buttermilk (soy milk, goat's milk)			
Jicama (water chestnuts)			
UGLI fruit (pomellos, mandarin orange)			
Parsnips (beets)			
Dried currants (lychees, dried figs)			
Tempeh (tofu)			
Garbanzo beans			

THANK YOU!



Code:

Center Name: _____

Food Friends Evaluation Survey (Post) **Teachers – Please complete AFTER conducting the** **12-week Food Friends program.**

Before you started the Food Friends project, we requested that you fill out a survey.

Now, we are asking you to fill out another survey after finishing it. There are two parts to this survey survey. The first part is about your opinions of the Food Friends program. The second part has questions about your eating habits and attitudes toward food (similar questions to the first survey). Your candid answers will help us adapt, if needed, the Food Friends program. **It should take approximately 20 minutes to fill out.** There are no right or wrong answers. There are no more than minimal risks associated with your participation in this project. There are also no direct benefits for participating in this study. Your answers will be kept confidential/anonymous by the researchers. **If you completed the questionnaire before the program and again now, you will receive a gift card for \$20 gift to Wal-mart.**

Please return to your FCS Extension Agent.

Part I – Your Evaluation of the Food Friends Program

1. What are your initial thoughts about the curriculum?
2. Of the activities listed below, please check which ones **YOU did** in your classroom? Place an X next to each activity you conducted.

<u>Suggested Activities</u>	<u>Additional Activities</u>
<input type="checkbox"/> Puppet Show	<input type="checkbox"/> Introducing MyPyramid
<input type="checkbox"/> Food Friends Activity Cards	
<input type="checkbox"/> Food Friends Theme Song	
<input type="checkbox"/> Fruit and Vegetable Mystery Bags	<input type="checkbox"/> Exploring with Our Senses
<input type="checkbox"/> One of These Foods Is Not like the Other	<input type="checkbox"/> Food Friends Detectives
<input type="checkbox"/> Food Collage	
<input type="checkbox"/> Couscous and Fruit Recipe	<input type="checkbox"/> Couscous Sand Art
<input type="checkbox"/> Draw or Paint the Food Friends	
<input type="checkbox"/> Counting and Classifying Beans	<input type="checkbox"/> Growing a Bean Sprout
<input type="checkbox"/> Ollie Says	<input type="checkbox"/> Radish, Radish, Cheese
<input type="checkbox"/> Food Friends Memory Game	
<input type="checkbox"/> Food Friends Puzzles	
<input type="checkbox"/> Rhyming with the Food Friends	<input type="checkbox"/> Bar Graph
<input type="checkbox"/> Food Friends Tasting Party	
<input type="checkbox"/> Edible Food Faces	
<input type="checkbox"/> Reading nutrition related books	<input type="checkbox"/> Ants on a Log Recipe
<input type="checkbox"/> Food Friends Fun from A to Z	

3. Of the activities that you did, which ones did YOU enjoy doing with the children the most? Why?
4. Of the activities that you did, which ones did **YOU** find the least enjoyable in doing with the children? Why?
5. Which activities do **YOU** feel were the most successful in teaching the children about new foods? Why?

6. For the whole Food Friends campaign, how many of the activities would you say you DID in the classroom?
- I co-taught the class with another teacher; we did all the Food Friends activities together
 - I did most of the activities on my own
 - I did about ½ of the activities, the other teacher the rest
 - I did a few of the activities, about ¼ of all of them
 - I did not do any of the Food Friends activities
7. From your observations, which activities did the CHILDREN like the most? If possible, please include specific comments or actions that show this.
8. Which activities did the CHILDREN seem to dislike or resist participating in?
9. What specific problems have you had with the activities in the past twelve weeks (e.g., too lengthy, boring for the children, too difficult, unclear directions, etc...)?

For questions 9 – 24, please circle the number that best reflects **YOUR** opinion. Feel free to add comments on the back of the page, especially if you circle 1 or 2. For the questions on foods, please respond for the food that you used in your classroom. For example, if you substituted melba toast for wasa, answer the question for melba toast.

10. Are the activity directions:

Very difficult to follow 1 2 3 4 5 Very easy to follow

Very hard to understand 1 2 3 4 5 Very understandable

11. Do you feel the activities are?

Hard to do with the kids 1 2 3 4 5 Easy to do with the kids

Common and boring 1 2 3 4 5 Unique and exciting

12. How would you describe the CHILDREN'S overall interest in and excitement

3



about the "Food Friends - Making New Foods Fun" campaign?

Very low 1 2 3 4 5 Very high

13. The **CHILDREN'S** overall participation in the campaign is:

Very low 1 2 3 4 5 Very high

14. How do **YOU** feel when teaching the campaign activities to the children?

Very unconfident 1 2 3 4 5 Very confident

15. How "new" did **YOU** feel that Gouda cheese was to the children? In other words, to what extent had the children "tried" the food *before* the Food Friends campaign?

Not "new" at all 1 2 3 4 5 Very "new"/ Never tried

16. How "new" did **YOU** feel that Daikon radish was to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

17. How "new" did **YOU** feel that couscous was to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

18. How "new" did **YOU** feel that wasa bread (melba toast/rye toast/pita) was to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

19. How "new" did **YOU** feel that buttermilk (soy milk/goat's milk) was to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

20. How "new" did **YOU** feel that jicama was to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

21. How "new" did **YOU** feel that UGLI fruit (or pomellos/mandarin oranges) was to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

22. How "new" did **YOU** feel that parsnips (canned beets) were to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

23. How "new" did **YOU** feel that dried currants (lychees, dried figs, dried persimmons) were to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

24. How "new" did **YOU** feel that tempeh (tofu) was to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

25. How "new" did **YOU** feel that garbanzo beans were to the children?

Not "new" at all 1 2 3 4 5 Very "new"/ never tried

26. Now after completing Food Friends, which of the following habits do **YOU** think have improved? Please check **all** that apply.

- The children try more "new foods" altogether (outside of Food Friends too)
- The children eat more fruits and vegetables now
- The children eat a wider variety of foods now
- YOU, personally, try more "new foods" now
- YOU, personally, eat more fruits and vegetables now
- YOU, personally, eat a wider variety of foods now

27. If you have your own pre-school aged children or have pre-school aged children living with you, which of the following habits do you think have improved after completing Food Friends? Please check **all** that apply.

- YOU offer more "new foods" at home to your children
- YOU offer more fruits and vegetables to your children
- YOU offer a wider variety of foods to your children
- Your OWN children try more "new foods" now
- Your OWN children eat more fruits and vegetables now
- Your OWN children eat a wider variety of foods now
- I do not have any pre-school aged children living with me

Part 2 – Your Eating Habits and Attitudes toward Food

Now, think about what you eat and how you eat. Please mark ONE box for each statement.

	Never	Rarely	Some- times	Fre- quently	Always
I am a picky eater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat until I am too full.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat until I feel satisfied.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I clean my plate.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat dessert after I finish my meal.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use food to get myself to do things.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat when I feel sad.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I try to control how much I eat to lose weight.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I sometimes feel badly about how much I eat.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am constantly sampling new and different foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't trust new foods.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



	Never	Rarely	Some- times	Fre- quently	Always
If I don't know what is in a food, I won't try it.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like foods from different countries.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ethnic food looks too weird to eat.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At dinner parties, I will try a new food.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am afraid to eat things I have never had before.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am very particular about the foods I will eat.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I will eat almost anything.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to try new ethnic restaurants.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Now, tell us about what you think about your role as a teacher and how you can influence your students' attitude toward food. Please mark one box for each statement.

	Strong- ly Dis- agree	Dis- agree	Neither Agree or Dis- agree	Agree	Strong- ly Agree
What I eat influences what the children in the classroom eat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How I react to food influences what the children eat (eg. if I make a face).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I won't try a food, then the children probably won't try it either.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

THANK YOU!





Code: _____

Please observe the children and mark down how many children tried the food and "liked it", how many tried the food and "didn't like it", and how many children "didn't try it". There should be only one mark for each child. The total marks for each food should be the same as the number of students participating in the Tasting Party.



Tasting Party Recording Sheet



Number of students participating: _____

	 Peaches	 O shaped cereal	 Gouda Cheese	 Doritos Bunch	 Olives	 Santitas Beans
"I liked it"						
"I didn't like it"						
"I didn't try it"						